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UNITED STATES

DEPARTMENT OF AGRICULTURE

BUREAU OF
ENTOMOLOGY AND PLANT QUARANTINE
NEWS LETTER

VOLUME VIII 4

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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR FEBRUARY 1941

Vol. VIII, No. 4 (Not for publication) April 1, 1941

ADMINISTRATION

Bureau Appropriations

The bill to provide appropriations for the Department for the fiscal year 1942 passed the House and is now being given consideration by the Senate. As it passed the House, the bill provides $5,198,493 for the Bureau, exclusive of white-pine blister rust funds. The $5,198,493 is $103,439 below the budget estimates. The budget estimates for the fiscal year 1942 provided the following increases and decreases in amounts of the appropriations for the current fiscal year:

Increases

Mexican fruitfly control	$ 7,500
Barberry eradication	20,000
Insecticide investigations	5,000
Foreign plant quarantines	20,000

Decreases

Citrus canker eradication	$ 13,485
Dutch elm disease eradication	100,000

The bill, as it passed the House, provides for reductions below the budget estimates for the following:

Mexican fruitfly control	$ 7,500
European corn-borer control	17,939
Barberry eradication	20,000
Bee culture	33,000
Insecticide and fungicide investigations	5,000
Foreign plant quarantines	20,000

The white-pine blister rust estimates have been handled differently this year, because of a change in the authorizing legislation intended to enable the appropriating powers to have all estimates for blister rust work before them at one time. The blister rust estimates, therefore, as submitted by the Bureau of the Budget amounted to $1,409,000, which included an increase of $100,000 for the Bureau, an increase of $50,000 for the Forest Service, and an item of $215,000 for the Interior Department. As the bill passed the House, these items were reduced to $1,159,000, the Bureau increase and the Forest Service increase being eliminated and the amount of the estimate for the Interior Department being decreased to $115,000.

FRUIT INSECT INVESTIGATIONS

Raisin moth larvae survive long cold storage.--Charles K. Fisher, of the Fresno, Calif., laboratory, reports that a few full-grown larvae of Ephestia figulilella Greg., collected December 12, 1938, were still in the larval stage 2 years later, after storage for most of that period at about 40° F. Four hundred larvae had been stored in paper cans which were partly filled with raisins and provided with rolls of corrugated paper for pupation quarters. They were exposed to outdoor temperatures from December 12, 1938, to April 10, 1939, when they were placed in a mechanical refrigerator. Seven were alive on December 4, 1940. After incubation at about 80°, 3 adults emerged in January 1941.

Temperatures above 60° F. bring plum curculio out of hibernation.--Investigations under field conditions have shown that a mean temperature above 60° F. for several successive days is required to cause the plum curculio to appear on peach trees in numbers from hibernation. Now Oliver I. Snapp, of the Fort Valley, Ga., laboratory, reports that investigations under greenhouse conditions confirm those under field conditions. On February 13, 1941, a cage containing 400 plum curculio adults hibernating in Bermuda grass and oak leaves was removed from an orchard and placed in a greenhouse, with the thermostat set at 60°. Observations showed that after this cage was placed in the greenhouse the temperature was never below 60° in the night and ranged from 60° to 80° in the daytime. No curculios appeared from hibernation on the first, second, third, and fourth days after the cage was placed in the greenhouse, but on the fifth day they began to appear on the screen above the hibernating material. Therefore, 5 successive days with a mean temperature above 60° was required to bring adult plum curculios out of hibernation under controlled-temperature conditions.

MEXICAN FRUITFLY CONTROL

Fruitfly status in the lower Rio Grande Valley.--The first larvae of the usual spring infestation of the Mexican fruitfly were found at Weslaco, Tex., on February 12. By the close of the month larvae had been found in grapefruit on 16 other properties. With one exception, none of these infestations were widespread throughout the groves. No forecast can be made as to the probable amount of infestation which might take place this season. Trap recoveries, however, indicate that no more than the normal amount of infestation is to be expected, as less than the usual number of flies is being taken. Sterilization rooms are in readiness to take care of any amount of fruit which might need to be treated before being shipped, and it is not believed that any out-of-the-ordinary difficulties will arise which will prevent the successful shipping of fruit and termination of the harvesting season as set forth in the regulations. Growing conditions were excellent for citrus during February. Heavy rains over the entire regulated area in January caused citrus trees to bloom profusely and all indications point to a heavy set of fruit.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Chinch bugs extract more substances from susceptible than from resistant sorghums.--R. G. Dahms and Larry Bewick, Lawton, Okla., report that preliminary tests conducted during August 1940, in which over 2,000 chinch bugs were used, showed that chinch bugs feeding for 8 hours on Dwarf Yellow milo (susceptible) gained on an average of 0.00012861 gram, whereas those feeding on Atlas Sorgo (resistant) lost 0.00001715 gram per bug.

Chinch bug oviposition increased when feeding on sorghum plants growing in solutions containing high nitrogen or low phosphorus.--According to R. G. Dahms, Lawton, second-generation chinch bugs laid 50 eggs per female more on Finney milo plants growing in nutrient gravel cultures containing a high amount of nitrogen than when the solution contained a low amount; however, the plant growth was apparently normal in both cases. On the other hand, plants growing in solutions containing a low amount of phosphorus laid a few more eggs than those feeding on plants growing in high phosphorus solutions. In these experiments the longevity of females was lower when the number of eggs per female-day was high than when it was low.

Concentrated sprays effective against Pantomorus peregrinus Boh.--H. C. Young, Florala, Ala., reports that S. F. Potts found calcium arsenate and cryolite more effective against *P. peregrinus* at Gulfport, Miss., during 1940 when applied in the form of a concentrated spray than when applied as a dust or dilute spray. From 3 to 10 gallons of the concentrated spray containing 3 to 15 pounds of insecticide was applied per acre. The concentrate contained water as a carrier and 0.1 pound of dissolved casein or 0.2 pound of raw linseed oil, or 0.1 pound of dissolved casein and 0.1 pound of raw linseed oil per pound of insecticide as an adhesive. Cotton and peanut foliage treated with this concentrated spray produced good mortality of the beetle after exposure for 2 weeks to natural weather conditions, in which 3 to 5 inches of rain fell. For the caged females, tests giving satisfactory control caused a reduction of 90 to 98 percent in feeding and a 93- to 98-percent reduction in viable eggs. This degree of control reduced the number of eggs per mass to about one-third of the normal.

European corn borer migrants from corn debris.--W. A. Baker, Toledo, Ohio, reports that E. W. Beck and K. D. Arbuthnot encountered an unusual survival in and around a piggery in eastern Massachusetts. Green cornstalks had been fed to hogs in the piggery, examination of which disclosed no measurable corn debris. Crevices between fence boards and posts were filled with a weblike material such as lepidopterous larvae produce. Many corn borer larvae, and even a greater number of pupal cases, were present. Although the stalks of this year's crop had been destroyed by feeding or trampling of the hogs, some of the larvae had escaped and found suitable hibernation quarters. The presence of pupal cases indicated that many larvae had passed the winter of 1939-40 successfully in this situation or were individuals of the first generation. The latter seems unlikely because very little early corn was grown by the owner this year. It was ascertained that corn from a 1939 field, which averaged about 17 borers per stalk, was fed to the hogs in this same piggery. Almost every crevice, crack, and nail hole along the fence and buildings forming a part of the enclosure showed evidence of borers. One pupal case was found under a shingle near the lower edge of the roof.

Influence of nutrition on successive generations of corn borer.--G. T. Bottger, Toledo, reports on the differential effect of nutrition on the rearing and development of successive generations of the corn borer in the laboratory, as indicated by infesting a few different kinds of green plant tissue with newly hatched larvae, rearing the surviving ones to maturity, and confining the progeny of each successive generation to the same type of food. When larvae of each generation were 15 days old they were weighed to determine any differences in size between generations which may have resulted from any of the various nutritive substances under test and also to determine the relative effect, if any, of the different nutriment on successive generations of the insect. Relatively low average weight and percentage pupation of the F_1-generation reared on sweet corn kernels preserved by the quick-freezing method were attributed to the too advanced stage of maturity of the corn when frozen. In other tests, corn kernels preserved by freezing have compared favorably with green beans and peas as a source of nutrition for the borer. The subnormal physiological condition of the F_1-generation borers nourished on corn kernels preserved by freezing may have been the cause of the very low average weight and percentage survival of the F_2 generation reared on this food. This generation failed to reproduce, which is considered as further evidence of a possible cumulative adverse nutritive influence in this instance. Failure of any test larvae to survive up to 35 days when reared on green cornstalks which had been quick-frozen was attributed to the physical condition of the corn tissue. Although the freezing process does not change the chemical composition of green plant tissue, it ruptures the cellular structure, causing a rather quick collapse of the tissue after thawing, which apparently is conducive to excessive mold growth and general decomposition. In various other tests corn borer larvae were reared on frozen corn tissue but the stalks, being more mature than those employed in these tests, were less succulent and consequently less affected by freezing. Furthermore, in previous tests with quick-frozen tissue, new material was supplied the larvae every 24 to 48 hours, whereas in the tests under discussion, the 5-day feeding interval, successful for most fresh green-plant tissues, was relied upon for all materials, whether frozen or fresh. Weights of larvae reared on green beans or peas through the F_4 generation indicated no appreciable influence of laboratory rearing on larvae up to at least the fifth generation.

Resistance of field corn to European corn borer.--L. H. Patch and R. T. Everly, Toledo, report: "Six commercial double-cross hybrids were used as 1 set of standards against which the borer populations in the other hybrids were compared. Each plant was infested by hand with 4 egg masses in addition to a light natural infestation of less than 1 egg mass. As a result the commercial hybrids averaged 6.41 borers per plant. The 6 most resistant experimental hybrids were R4 X Wis. CC5, R4 X Kan. G-30, R4 x Mich. 285, R4 X L317, (R4 X Hy) X L317, and (L317 X Hy) X R4. With the exception of inbred Hy, the inbreds involved in these crosses had shown marked borer resistance in past tests. The 6 hybrids averaged 2.94 borers per plant, or 54.1 percent less than the number of borers in the 6 commercial hybrids. The relative maturity of the strains was considered in making this comparison. A group of 6 New Jersey hybrids, tested for the first time and including 2 commercial double crosses, averaged 8.09 borers per plant, or 26.2 percent more than the standard hybrids. The New Jersey hybrids were the most susceptible to the borer of any tested. One group of single-cross hybrids involved 14 inbreds crossed on borer-resistant inbred Ill. R4. These inbreds were used because of their promise of containing some resistance to the borer in previous tests. Another group of 14 single crosses involved the same inbreds crossed on partially borer-resistant inbred Ill. Hy and a third group involved the same inbreds crossed on borer-susceptible inbred Ill. A. The three groups averaged 3.86, 5.56, and 6.85 borers per plant, respectively, indicating that the borer resistance of inbred R4, the partial borer resistance of inbred Hy, and the borer susceptibility of inbred A were transmitted to the single crosses. The 14 inbreds were also tested as inbreds. The combined correlation coefficient between the borer populations in the inbreds and their crosses on inbreds R4, Hy, and A is +0.7206. The very high significance of this value indicates again that the factors for borer resistance in the single crosses were inherited from the inbreds in this experiment and that inbreds may be used to test the borer resistance of unknown material, at least in a preliminary test."

Inheritance of field-corn resistance to European corn borer.--Messrs. Patch and Everly are studying the inheritance of field-corn resistance to the European corn borer by observations on the borer resistance and susceptibility of segregates out of a single cross of 2 resistant inbreds, R4 and L317. In 1939 the kernels from 1 ear of (R4 X L317) F_2 were planted and each plant was selfed, obtaining 142 ears. In 1940, half the seed from each ear was planted and the F_3 plants were given the usual test for their resistance to borer survival by infesting the plants by hand with a given number of egg masses and counting the borers maturing. In other words, the segregation of the F_2 plants of R4 X L317 was studied on the basis of the performance of their progenies. Each line was planted on May 22 in 1 2-hill plot in each of 4 blocks or replications. The plants were infested from July 13 to July 24 and 6 egg masses per plant, averaging 124.8 eggs per plant. The lines silked from August 5 to August 13. When the plants were infested on the mid-date July 18, the segregates averaged 51.4 inches in height to the tips of the leaves extended upward, the infestations being made before the tassels became a factor in borer survival. An average of 6.54 borers per plant survived in all the plants dissected the last week of August. Statistical analysis showed highly significant variation among the borer populations in the individual lines. Since the lines differed significantly among themselves in number of borers surviving, the especially borer-resistant and borer-susceptible lines were determined. On the basis of odds of 39 to 1 against a mean varying negatively from the mean of all lines silking on the same date to the extent of 1.966 or more times the standard error of estimate due to chance alone, only 3.6 lines on the average would be expected to vary to that extent. Actually 17 lines were found to contain that low level of borers. Seven of these lines averaged 4.3 borers per plant, as compared with 8.7 borers in 9 lines that were found to contain significantly more than the expected number of borers.

Relation of field corn planting dates to yields under corn borer conditions at Toledo.--Messrs. Patch and Everly have also been investigating the combined effects of field corn infestations by first- and second-generation European corn borer larvae in relation to planting dates, as reflected in final yields of bushels per acre of 15.5 percent moisture content. In the 1940 program, plantings of the single cross hybrid A X TR were made on May 3, 13, 23, and on June 1 and 11. As the ears of all except the June 11 plantings were beyond the milk stage on September 10, when the second-generation borers were one-quarter grown, it is believed that the second-generation borers reduced the yield of the earlier plantings very little if at all. Experiments conducted during 4 years showed that the amount of reduction in yield caused by first-generation borers to corn normally yielding 85 bushels per acre is considerably more per borer in the early June plantings than in the early May plantings. For corn normally yielding more than 85 bushels per acre the reduction in yield was found to be somewhat greater. These greater reductions in yields per borer due to later planting and higher levels of yield, together with the differential effects of weather and the differences in the number of mature borers between the plantings due to differences in the number of egg masses laid and the rate of borer survival, had their combined effect on the yields made by the plantings. In 1940 the May 3, May 13, May 23, June 1, and June 11 plantings gave yields of 99.3, 103.6, 104.4, and 87.6 bushels per acre, respectively, of 15.5 percent moisture content. The standard error of the yield of the first and last plantings with six replications is ± 1.37 bushels, and of the intermediate plantings with 10 replications is ± 1.07 bushels. Since May 13 to 23 may be considered a normal time for planting corn in the locality under study, there was nothing gained this year by delaying corn plantings to escape damage by the corn borer. In 1939, when a late summer drought occurred, the May 13 planting gave the maximum yield, even though it was infested with 2.0 and 3.5 more first-generation borers per plant than the May 23 and June 2 plantings. In 1939 and 1940, therefore, plantings made at the normal time resulted in maximum yields under the conditions of weather and corn borer infestations for the locality studied.

Relation of survival of European corn borer larvae to level of egg populations.--Messrs. Patch and Everly have also established a relationship of lower survivals of European corn borer larvae with increasing numbers of corn borer egg masses per plant. As an average of plantings made on May 8, May 17, May 25, and June 3, the number of borers resulting from the different levels of egg infestation ranged from 4.50 per plant in the 1.5 egg-mass or 31 eggs-per-plant level to 6.63 per plant in the 12 egg-mass or 250 eggs-per-plant level. Placing twice as many eggs on the plants (3 versus 1.5 masses) resulted in no increase in the borer population, 4 times as many eggs (6 versus 1.5 masses) resulted in a 21.8 percent increase in the borer population, and 8 times as many eggs (12 versus 1.5 masses) resulted in a 47.4 percent increase. A surprisingly small increase in the number of borers resulted, considering the number of eggs placed on the plants. The increase was no greater on the May 8 and May 17 plantings, although these plantings were more mature and in a better condition to maintain a higher level of borers. There were no differences in the date of silking between the plots infested with different levels of egg infestation.

Damage to sweet corn by second-generation corn borer larvae and by corn earworm in relation to time of planting.--In a series of plantings of sweet corn made by Morris Schlosberg near Toledo, progressively higher rates of damaged ears were found in the later plantings. For plantings made on May 23, June 8, June 15, June 25, and July 5, the percentages of injured ears were found to be 22, 38, 43, 60, and 74, respectively. Under the single- and two-generation strain conditions of the European corn borer in the vicinity, infestation of the plantings by the corn borer was mainly from oviposition by the second-generation moths, progressively higher levels of larval populations appearing in the later plantings. The increased rates of damaged ears in the later plantings were associated with this factor, plus an increasing rate of infestation by the corn earworm as the season advanced. In relation to the plantings given above, of the total numbers of corn borer larvae in the plants, 31.7, 35.7, 47.0, 57.8, and 64.3 percent, respectively, were in the ears (including nubbins). The increased numbers of corn borer larvae in the ears in the later plantings were associated, in part, with their higher levels of larval populations in the plants and, in part, with the presence of the ears at the time of infestation, a condition conducive to their invasion. When infestation of the plants occurred prior to the appearance of the silks, a larger proportion of the larvae tended to invade and remain in the stems, and was reflected in the production of fewer and smaller ears, owing to direct injury of the plant.

JAPANESE BEETLE CONTROL

Municipally sponsored Japanese beetle control.--George H. Hollister, superintendent of parks of Hartford, Conn., has submitted the following report concerning damage by Japanese beetles in the city parks: "Japanese beetle grubs did considerable damage to the lawn areas in four of our parks during the season 1940, namely, Keney Park and Keney Park golf course in the south end, Colt Park in the east side, and Pope Park in the southwestern part of the city. We found as many as 50 grubs per square foot in a number of different areas and the damage was quite severe, as we were able to pick the turf up as you would a rug. We treated approximately 135 acres with lead arsenate late in August and early in September, spraying it on and washing it in with a sprayer. The cost of applying the lead and washing it in averaged about $42 an acre. This year we are planning to treat more of our lawn areas. We hope to be able to do this work before rolling in the spring, when the surface of the ground is porous, and rely on early spring rains to take the poison down where the grubs are when they are feeding."

Adult beetles collected.--On February 24 and 25, inspectors from the Philadelphia district office collected 537 adult Japanese beetles in greenhouses. These were delivered to the Japanese beetle research laboratory at Moorestown, N. J., for use in experimental work. Although 400 specimens were collected at one establishment under favorable weather conditions, the adults were comparatively scarce. At another rose grower's establishment at Kennett Square, only 7 beetles were found in a large range of greenhouses. Many of the growers contacted reported fewer beetles than in the past. A number of these unclassified establishments sterilize their soil before planting, thereby destroying the larvae. The greatest number of adults was taken from the foliage of Better Times, a red rose. Foliage feeding on this variety was noticeable and light infestation on the blooms was also noted.

Plant-shipping establishments canvassed in newly regulated areas.--Surveys of nurseries, greenhouses, and plant-growing establishments in the sections of Maryland, New York, Pennsylvania, Virginia, and West Virginia added to the Japanese beetle regulated area under the revision of the regulations effective February 12, 1941, were in progress at the end of the month.

Inspection activities in Pennsylvania.--Classified growers of nursery and ornamental stock in the Pittsburgh area are anticipating for 1941 the biggest sales season since 1929. Notwithstanding the severe weather during February, there was a marked increase in the movement of quarantined products to points outside the regulated area. The material consisted mostly of greenhouse stock, although a few shipments of nursery stock were certified. Growers in the central Pennsylvania district report a scarcity of Easter-bulb stock, with no hyacinths and only a few tulips. Some growers are trying to push cinerarias and calceolarias to replace them. One large grower has one-third more Easter lilies and 25 percent more azaleas than usual.

Certification of sports exhibit materials.--Twenty-five inspections were made of materials moving from the Boston Sportsman's Show, held from February 1 to 9, to the New York Sportsman's Show, starting on February 15. Those in charge of the various State exhibits were well informed of the plant quarantine regulations and came to the show this year with the materials properly certified or with proof that the products originated outside the regulated areas. The inspections ranged from a single piece to a carload lot. Both Japanese beetle and gypsy moth certifications were involved. Most of the materials collected in New Hampshire and Maine were inspected and certified under the gypsy moth regulations by the local district inspectors at the collection points and were recertified to New York on the basis of the initial examination. All materials inspected were found free from the gypsy moth.

Reduced supply of stored lumber.--District inspectors in New England report that, with the exception of hurricane lumber, there is very little local, yard-dried lumber left from the cutting and sawing of last spring and summer. The hurricane lumber is being inspected and shipped at the rate of approximately 10 million board feet per month. The district inspector at Greenfield, Mass., reports that the mills now operating are shipping their green lumber about as fast as they manufacture it. Most of the green lumber is being used locally, although some is being shipped to points outside the gypsy moth regulated area. Piece-by-piece inspection is required of the lumber to be certified, as the saw logs in this area average very small, with the result that the so-called square-edge lumber, as well as the round-edge, is likely to contain more or less bark which may harbor egg clusters.

Nursery stock moving from New England.--Although 1 foot of frost was encountered in digging the trees, a nursery near Boston presented for inspection and certification on February 12, a carload of nursery stock for shipment to Michigan. The shipment consisted of 183 specimen hemlock trees from 5 to 10 feet in height. Two gypsy moth egg clusters were removed from this shipment. This consignment was well in advance of the regular spring shipping season. A nurseryman in the Portland, Maine, district on February 10, with the temperature 10° below zero, requested inspection and certification of 1,100 young evergreens and evergreen seedlings, for shipment to the States of Washington and Colorado. Shipments of nursery stock inspected last fall and stored over winter were quite heavy during February. Nurseries that handle this type of stock are located in central Connecticut and western Massachusetts. These firms report an increase in shipments, as compared with 1940. During February district inspectors in the New England area scouted all greenhouses certified under the Japanese beetle quarantine regulations. These were found free from infestation.

State gypsy moth nursery scouting.--Under the direction of Connecticut State inspectors, employees at one of the large nurseries in the Middletown, Conn., district treated 20 gypsy moth egg clusters in a block of hemlock trees on the premises. The State scout crew did not finish the inspection of the nursery during February, as some of the evergreens are brittle and may be broken off while frozen. A heavy gypsy moth infestation was found by another State scouting crew in Rocky Hill, bordering the Connecticut River.

Demands for New England minerals increase.--Calls for certain minerals used in the National Defense program have resulted in renewed interest in feldspar, mica, beryl, and other minerals found in sections of New England. Many old abandoned mines are being investigated and their products sampled. Inasmuch as these mineral products come under the gypsy moth quarantine regulations, the district inspectors have been called upon to inspect and certify the sample shipments.

European corn borer certification work.--Interception by State inspectors in Oregon of several shipments of chrysanthemum and aster that had not been inspected and certified with Federal European corn borer certificates led the shippers in Holland, Mich., to request such inspection and certification of their chrysanthemums, asters, and dahlias. This establishment was visited several years ago and at that time our inspectors were told that they did not ship to any of the nine States that require Federal corn borer certification. The corn borer inspector stationed at Detroit, Mich., reports that one of his larger shippers will start moving stock about March 1. This inspector also reports that dahlia growers are still busy shipping clumps and roots under Federal certification. Forty shipments were inspected and certified from that area during February.

Cooperation in Dutch elm disease control received from Connecticut State Park officials.--A. V. Parker, Superintendent of Connecticut State Parks, recently issued the following notice to park superintendents and caretakers working under his supervision: "To park superintendents and caretakers at units of the State Park system listed on reverse: You are hereby authorized to allow men working for the United States Department of Agriculture, or for the Connecticut Agricultural Experiment Station, to remove dead trees that are causing the spread of disease, beetles, etc.; also to allow them to cut away parts of living trees, if their operations in so doing will not seriously injure the trees for park purposes. Keep in mind that the men on this work have but one object in mind, which is to check, or eradicate, the trouble they are fighting and we do not want to stand in their way. We, on the other hand, have State parks to consider and care for and the trees are a very important feature in our work. We should, therefore, be very sure that it is vitally necessary to cut, trim, or prune, before doing so ourselves, or allowing others to do so." This is another advance in the Division's efforts to obtain full cooperation from the various agencies throughout the State, particularly those with widespread holdings and operations, such as the State Parks, State forests, State highways, utility companies, and contractors.

Experimental burning of elm woodpiles in Ohio.--With the consent of the local fire warden, experiments were conducted in February to find a satisfactory method of covering incompletely consumed burning piles at the end of the day's work. The procedure tried involved chunking all unburned logs into as compact a pile as possible. The entire pile is then covered with a layer of soil at least a foot thick. The soil forms a protective covering to prevent the fire from escaping during the night, and at the same time allows the remainder of the unburned material to be consumed by the following day. In nearly every instance, the piles were completely burned by the next morning, except perhaps for a few ends. The soil in most locations contains sufficient clay so that it is baked by the heat and forms a dome over the logs. The following morning the soil is leveled out and any remaining log ends are burned. The trials have indicated that this method of safeguarding fires at night is superior to completely extinguishing them at the end of the day, a procedure that requires considerable labor to rekindle them.

Difficult removal of elm in Ohio.--Difficulties were encountered by elm-sanitation workers in the removal of a 45-inch elm which had to be taken out of Buck's Lake at Garden, Athens County, Ohio. This is an artificial lake constructed for recreational and fish-propagation purposes. Raising of the water level caused the tree to decline, rendering it potential beetle material. The men were obliged to use boats to reach the tree and fell it, as the water at the trunk reached a depth of 10 feet. It was possible to fell the tree so that all of the crown and half of the trunk fell on the bank. The lower half of the trunk had to be sawed into sections in the water and pulled onto the bank by block and tackle. A 60°

incline added to the task of pulling out the logs. Two crews supplied the pulling power.

Beetle wood collected for rearing and culturing.--Several units were assigned early in February to collect beetle-infested elm wood from districts around the margin of the major disease area. This wood was brought into the headquarters at Bloomfield, caged in a constant-temperature, lighted insectary, and the emerging bark beetles were cultured by a special technique to determine whether they bore *Ceratostomella ulmi*. Collections will continue in a general area within 25 miles of the known limits of the disease area and along selected highways, railroads, and streams where concentrations of elms may be found. Collections will be made at 2-mile intervals when this is possible.

Storm-damage survey in Bethlehem, Pa., district.--A survey of the damage caused by the ice storm of January 16 and 17 last in the Bethlehem district has disclosed that only a small number of elms was damaged in the northern and central portion of the district, with the damage confined mostly to small branches and twigs. Damage is slightly higher in the southern areas of Montgomery and Bucks Counties, although broken material in these counties is mostly small branches under 2 inches in diameter. Trees other than elms were hardest hit. Approximately 15 elms have been tagged for removal because of storm-broken branches.

Beetle-infested area in Connecticut sanitized.--Elm-sanitation operations were completed early in February in the heavily infested beetle area at a beaver swamp in New Milford Township, Litchfield County, Conn. A total of 722 beetle-infested elms and 22 elms that contained wood liable to be attacked by bark beetles were removed. The trees subject to attack were within the flooded area, but had not been weakened enough to harbor beetles.

Clear-cutting operations in New Jersey.--Clear-cutting work to rid a small beaver swamp of elms near Lake Hartung, Jefferson Township, Morris County, was completed in February. Most of the elms in the flooded area were dead, with most of them heavily infested with *Scolytus multistriatus* Marsh. and *Hylurgopinus rufipes* Eich. Clear cutting was also completed in the Basking Ridge section of Somerset County, N. J.

Hog-girdled elms to be removed.--Approximately 250 elms that had been girdled by hogs were located in Wayne Township, Marion County, Ind., a section of the Indianapolis work area. Most of these were red elms and were still too green for bark-beetle attack. Permission has been obtained for removal of the trees, although the wood is to be left for the owner to use before this year's beetle emergence.

Lumbering operations increase bark-beetle population.--Bark-beetle-infested material in the Albany County, N. Y., area will run high, owing to lumbering operations carried on in that section. A considerable amount of elm slash was left on the ground. This has become heavily beetle infested.

FOREST INSECT INVESTIGATIONS

Larch sawfly and hemlock looper in northern Rocky Mountains.--J. C. Evenden, of the forest-insect laboratory at Coeur d'Alene, Idaho, reports that the larch sawfly, which was reported from the Flathead National Forest in 1934, is now known to occur to the south and west for more than 100 miles. Although there are spot infestations of this insect throughout the Kootenai, Cabinet, and Coeur d'Alene National Forests, no serious damage has occurred. Mr. Evenden also reports that the severe epidemic of the hemlock looper which occurred throughout the alpine fir stands of Idaho and Montana in 1937 has been reduced through natural agencies to a point where it is no longer in evidence. During the short period of its existence a large percentage of the defoliated trees were killed; however, as this tree species is of little economic importance, the fire hazard which this destruction created is of the greatest consideration.

California pine scale causes damage to ponderosa pine.--During the spring of 1940 a severe infestation of the California pine scale (Nuculaspis californica (Coleman)) was found by H. L. McKenzie on mature ponderosa pines on Timber Mountain, Modoc County, Calif. This needle-infesting scale was apparently causing serious defoliation resulting in stunted needle tufts and a rather thinned appearance of the crowns of the trees. Whether the injury noted was entirely due to the needle scale or to infestations of Matsucoccus spp., also observed on stems of the pines, has not as yet been determined. For the last two seasons infestations of this same insect have been causing serious injury to pines on summer home tracts on the San Bernardino Mountains of southern California. One area is localized near Crestline, covering roughly about 700 acres between Lake Gregory and Camp Seeley. In some parts of the Crestline area the scale has become so bad on trees, which form the only cover for certain summer homes, that these pines are suffering very severely. Some trees have become badly stunted as a result of repeated defoliations and such trees appear to be more susceptible to attacks of flathead borers and secondary cambium-mining insects.

Matsucoccus[1] scale found on mature ponderosa pines in California.--Studies to determine the nature of the distribution of Matsucoccus spp. populations on low- and high-risk ponderosa pine trees in northeastern California, and also to ascertain the distribution and numbers of scales in relation to areas of tree crowns showing conspicuous deterioration and flagging, were initiated by H. L. McKenzie in 1940. A sketch of each tree, made in the field while the tree was standing, was included on a form sheet, and any unusual crown features, such as dead areas, flagging, or an old top-kill were indicated. After felling, the points from which the sample branches were taken were indicated on the tree sketch. From the limited data accumulated (8 trees to date) the following generalized statements may be made: (1) All trees examined, whether low- or high-risk types, carried infestations of Matsucoccus spp. scale in varying intensities; (2) heavier populations of scale are most likely to be found on trees exhibiting twig-flagging; and (3) high-risk trees show greater populations of scale than do the low-risk types.

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[1] Matsucoccus bisetosus Morrison; M. californicus Morrison, and M. sp. (probably secretus Morrison).

Relation of Scolytus multistriatus to latent infections of Dutch elm disease.--During the period 1938-40, W. D. Buchanan, of this Bureau, and S. J. Smucker, of the Bureau of Plant Industry, Morristown, N. J., conducted an experiment with S. multistriatus Marsh. and its relation to revival of latent infections of Ceratostomella ulmi in elm. In the spring of the year nursery trees were inoculated with C. ulmi. Some of these were subjected to feeding attack by disease-free S. multistriatus in the following spring; others in the next spring. It was found that the feeding of the insect in diseased tissue of the crotches and trunks of the trees did not result in revival of external symptoms of the disease. The beetles very rarely picked up C. ulmi in feeding on the diseased tissues of trees containing latent infection. Further evidence of this fact appeared when logs of recently felled disease-free trees were exposed to attack by these beetles. Numerous galleries were formed but in no case was C. ulmi recovered from them.

Toxic and repellent sprays for elm bark beetles.--R. R. Whitten, Morristown has prepared a manuscript on toxic and repellent sprays for the control of elm bark beetles. It is based on experiments that he has conducted A total of 19 different spray mixtures were tested for their repellency or toxicity to the two principal elm bark beetles, S. multistriatus and Hylurgopinus rufipes Eich. The cost per gallon of these sprays ranged from 12 to 55 cents. Bark-moisture percentages (expressed in terms of dry weight) from 30 to 139 were found not to affect the results of these sprays. Air temperatures above 50° F. were found best for optimum results. The age of the bark-beetle brood had no significant effect on the toxic effect of the sprays. Based on emergence per 100 millimeters of egg galleries, reductions over checks for these mixtures ranged from 68.4 to 100 percent. Based on the number of egg galleries per log, 9 of the 19 mixtures gave reductions over checks ranging from 75 to 100 percent. Certain of these repellent treatments were exposed to weather from 7 to 52 weeks and to bark-beetle attack from 4 to 20 weeks. Repellent sprays applied early in May were found effective for the entire active season. Certain of these mixtures applied to tightly ranked, 1-cord, elm-wood piles under field conditions gave good repellency and kill. From 2.45 to 3 gallons of spray, costing from 49 to 78 cents, was found necessary to treat wood piles having between 604 and 775 square feet of bark surface.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Weather aids gypsy moth control work.--Climatic conditions, while distinctly unfavorable at times, were generally better than usual during February, and satisfactory progress was made in gypsy moth work during the month. The snow in western Massachusetts and Vermont has not been deeper than 30 inches at any time this winter, and has averaged 18 to 24 inches during most of the period. This condition is rather unusual, as the depth of snow in mid-February is more likely to range from 4 to 5 feet in the wooded and mountainous areas. All types of gypsy moth work have been aided materially by the relatively small depth of snow.

Thinning and cutting crews make good progress.--Crews engaged in thinning work at gypsy moth infested locations confined their cutting to the removal of the larger worthless trees during the periods when the snow was deep, as they could be felled and cut into sizes suitable for burning much more easily than the snow-covered small growth.

Scattered infestations found in Vermont.--Gypsy moth scouting work was completed during the first part of February in Castleton Township, Rutland County, Vt., and the crews began work in Benson and Fair Haven Townships, also in Rutland County. Occasional scattered egg clusters were found and creosoted, but no serious infestation has yet been discovered. Two small colonies were found in an extensive tract of woodland at a relatively high elevation in Benson. While a moderate amount of oak, which is particularly favored as food by the gypsy moth, is scattered through the wood lot, the small number of egg clusters found to date indicates that the infestation can be readily eradicated. Additional gypsy moth infestation was also recently located in Bristol Township, Addison County, where a limited amount of scouting last year resulted in the discovery of several small infested areas that were thoroughly sprayed later in the season.

Birch lots scouted in Bennington County, Vt.--Gypsy moth scouting work was temporarily discontinued in Manchester Township, Bennington County, late in January, and the crew was transferred to an area in the adjoining town of Dorset, where the cutting of paper birch trees had been started. The trees were cut into 4-foot lengths and the logs were trucked to a wood-working mill in Berlin, Rensselaer County, N. Y., and converted into bobbins, dowel stock, and wood novelties. Several gypsy moth egg clusters were discovered scattered through the wood lot and were creosoted in order to prevent the spread of infestation to uninfested areas. Birch logs cut in Woodford Township, in the southern part of Bennington County, were also shipped to the same mill, and a small number of egg clusters were found and destroyed in the timber lot where the logs originated. The scouting of both these wood lots was completed early in February.

Hurricane damaged timber lots difficult to scout.--Gypsy moth scouting crews working in Eden Township, Lamoille County, and in Lowell, Orleans County, Vt., continued to encounter hurricane-damaged timber lots. In such areas the large growth had been uprooted, and the falling trees had smashed down all small growth in their path. Dense thickets of underbrush have grown up through the tops of the windfalls during the 2½ years that have elapsed since the hurricane, making an almost impenetrable thicket which is extremely difficult to examine for gypsy moth egg clusters.

Control work eliminates gypsy moth infestations on edge of barrier zone.--Scouting work was completed during the first part of February in an extensive area in Cummington Township in Hampshire County, Mass., which was heavily infested by the gypsy moth last year. The infested woodland in this town, which borders the eastern edge of the barrier zone, was thoroughly sprayed last June as a protection to the barrier zone. The effectiveness of the spraying is evident, as the scouting work revealed no new gypsy moth infestation in the treated area.

Scattered small logging operations increase gypsy moth scouting work.--More small logging jobs are being conducted this winter than for several years throughout Berkshire County, Mass. The lots from which logs are to be hauled to other localities for sawing and manufacture are carefully scouted for the gypsy moth, and all egg clusters are creosoted. Several scouting crews are now engaged in the examination of these scattered woodlots in order to prevent the spread of gypsy moth infestation through this channel.

Scouting work completed at two gypsy moth infestations in Connecticut.--Gypsy moth scouting work at an infestation in Roxbury, Litchfield County, Conn., and at an adjoining infestation in Southbury, New Haven County, was completed early in February. Work at these colonies had progressed slowly because an insufficient number of workers were available to conduct the work in the most efficient manner in southwestern Connecticut.

Destruction of dead chestnut trees improves scouting conditions.--Large quantities of dead chestnut trees were cut and burned by gypsy moth thinning crews at some of the infested sites in Cornwall Township, in the north-central section of Litchfield County, Conn. It was difficult to locate all of the egg clusters on these dead trees, which had become so weathered that the coloration was similar to that of the gypsy moth egg clusters. As there was no safe way of reaching and creosoting the egg clusters deposited high up on the dead trees, it was necessary to chop the trees down and destroy them. The removal of these trees will permanently improve future scouting conditions in this section.

Unusual gypsy moth infestation found in Pennsylvania.--A large number of new gypsy moth egg clusters was discovered on a single white oak tree in a woodland area in Jenkins Township, Luzerne County, Pa., which was carefully scouted last year. Conditions were somewhat unusual in that the infestation was confined almost entirely to one tree, and a close examination failed to disclose any old egg clusters. The origin of the infestation was puzzling until it was learned that surface stone, gathered from stone walls in that vicinity, had been assembled under this tree preparatory to use on a road-building project. It is believed that one or more infested stones were responsible for the establishment of the infestation on the oak tree.

Gypsy moth egg clusters found on surface stone and mine timbers.--The movement of surface stone for use in road building in Pennsylvania increased somewhat as the snow disappeared and permitted the resumption of road work. All stone originating within the quarantined area is carefully examined for gypsy moth infestation before permission is given for its removal, in order to prevent the spread of infestation. During one week in February, five gypsy moth egg clusters were found and destroyed on four different shipments of surface stone originating in Pittston Township, Luzerne County. During the same week, four new egg clusters were found on mine timbers cut in Bear Creek Township, also in Luzerne County.

W. P. A. gypsy moth employees transferred to National Defense work in Pennsylvania.--All W. P. A. gypsy moth field workers in the Pennsylvania area were interviewed by W. P. A. employment officials during February. Group interviews were held at designated points, either at the beginning or at the end of the day, so that a minimum amount of time would be lost to gypsy moth work. Employees whose work histories indicated some experience or profession that might be of value to National Defense work are being rapidly transferred to activities connected with that program.

Motor vehicles transferred to gypsy moth work.--A fleet of motortrucks, consisting of 20 pick-up type machines and 5 1½-ton trucks, was recently received at Wilkes-Barre, Pa. The machines were transferred to the gypsy moth project from the Grasshopper and Mormon Cricket Control at Denver, Colo. The trucks were urgently needed on the gypsy moth work to replace some of the worn-out equipment.

C. C. C. gypsy moth work during February.--The enrollment of the C. C. C. in February in this area has been below normal and, although the quota has been reduced from 206 to 167 enrollees per camp, very few camps have been filled to the reduced quota. The situation has been helped somewhat by permitting enrollment 8 times a year instead of 4, but there is still a deficiency in the numbers of enrollees. Some camps have as few as 65 or 70 enrollees available for work. The allotment for gypsy moth work has run fairly even and has ranged from 1,459 6-hour man-days during the first week of the month to 1,557 for the week ended March 1. The plan of work for February called for considerable scouting, and this was done on suitable days. On extremely cold and windy days, on stormy days, and on days of poor visibility, the men were used on thinning and burning work, so that no time is lost to gypsy moth work unless the conditions are very severe. During the thinning work the slash is piled and burned in a strip at least 100 feet wide along the roadsides, but the debris is scattered on the ground to deteriorate inside of this roadside strip, when possible, in order to reduce the cost of operation. Numerous large spreading oaks were removed during the month, some by chopping and others by girdling. Such work reduces the percentage of favored gypsy moth food plants at a low cost, especially when the trees are girdled. Many old apple trees were also removed from abandoned pastures, although an occasional tree was left for the encouragement of wildlife. A few hollow logs were also left in areas of general gypsy moth infestation to aid in wildlife management.

Close cooperation by C. C. C. with State and town gypsy moth officials and State foresters.--The C. C. C. cooperates in many ways with other agencies concerned with gypsy moth work in order to promote the efficiency of the work as a whole and to prevent duplication of work by different organizations. C. C. C. gypsy moth foremen in Massachusetts discuss and plan their work with the local moth superintendents. In Vermont, cooperation with the State entomologist has resulted in efficient work done around lunching and camping spots and at the storage place of a large fleet of trucks used in the express business, where severe gypsy moth infestations are present. The two organizations have worked together at some of those locations in creosoting egg clusters and in thinning work. Close cooperation is maintained with foresters in the areas where the C. C. C. is engaged in gypsy moth work. In some States the actual marking of trees to be removed is done by foresters or by gypsy moth foremen who have been trained by the foresters. In one case in February the assistant State forester of Vermont was requested to attend a conference with a property owner and gypsy moth foremen, in order that the best program could be determined for the treatment of woodland property containing a considerable gypsy moth infestation. The woodland was examined and suggestions made for treatment which combined good forestry practices as suggested by the forester and for gypsy moth cutting. In some cases pure cutting was recommended by both agencies and the forester was able to suggest the most desirable species to be planted, based on soil and other conditions. Occasional conferences of this kind have resulted in improving gypsy moth forestry practices, especially in relation to developing stands of timber more resistant to the insect.

Favorable food plants removed at dangerous location.--An area of some 35 or 40 acres located on a high elevation in Vermont received gypsy moth chopping work in February. The growth in much of this area consisted of a very heavy stand of alder which contained scattered gypsy moth infestations. The conditions were serious because of the danger of the build-up and spread of the insect from this location. The danger was removed by cutting out the favored food plants and leaving those less favored by the gypsy moth. A similar area treated in this way 3 years ago now shows the development of a stand which is much more resistant to the gypsy moth.

C. C. C. gypsy moth training leads to permanent employment.--It was learned during the month that one of the New England States which has a position open for a gypsy moth foreman has confined the applicants to C. C. C. enrollees who have been trained on gypsy moth work. This speaks well for the training given to the enrollees on this work, and should encourage them to produce good work while in the C. C. C. Many enrollees who have been trained to climb trees with spurs and ropes on gypsy moth work have obtained well-paid employment with tree and telephone concerns, and many others have been given employment because of the training and experience they have had in other types of C. C. C. gypsy moth work.

PLANT DISEASE CONTROL

Nearly 2,000 square miles surveyed in Missouri in 1940.--According to George M. Frandsen, in charge of barberry eradication in Missouri, 338 barberry bushes were destroyed on 32 properties as a result of an intensive survey of 1,980 square miles. In commenting on accomplishments of the last year, Mr. Frandsen points out that approximately 90 percent of the area covered is now believed to be entirely free of barberries and will require no further attention. The remaining 10 percent, or approximately 190 square miles, will need at least one more intensive survey. The counties in which bushes were destroyed during the year were Callaway, Carroll, Chariton, Franklin, Jackson, Linn, Macon, Ray, St. Louis, St. Louis City, and Sullivan.

Accomplishments in Iowa.--D. R. Shepherd summarizes progress made in barberry eradication in Iowa during 1940, as follows: "The survey in Iowa in 1940 was completed in areas comprising 3,627 square miles in 36 counties. Of the territory covered 2,817 square miles was initial survey, 432 square miles initial semi-intensive survey, and 377 square miles subsequent intensive survey. In addition to this, some limited areas, principally the site of all former bushes, were reinspected in Dickinson, Plymouth, Sioux, and Woodbury Counties. In the area covered in 1940, 4,967 barberries were destroyed on 189 new and 179 resurvey properties. Although barberries were found on a large number of new properties, it was noticeable that the area where we made the initial survey was definitely marginal and practically devoid of areas of escapes. The territory covered consisted of those counties or parts of counties where the barberry was never widely used for hedge or ornamental plantings and where it was expected that only scattered small plantings and single bushes would be found. Considering the resurvey work as a whole for 1940, barberries were found on 179 of the 990 old properties, or 18 percent of the old properties inspected. This figure is consistent with the results of reinspection work done during the last 5 years. The 377 square miles of subsequent survey completed in 1940 were in areas where a heavy infestation was found 5, 6, or 7 years before. The results in Winneshiek County probably indicate fairly well the conditions that we might expect to find in comparable areas of heavy infestations where the initial intensive survey has been completed since 1933. Listed below is a comparison of the results of the initial survey made in 1933-35 with the subsequent survey in the same area in 1940.

Survey	Year	Properties having bushes	Barberries destroyed	Salt used
		Number	Number	Pounds
Initial------	1933-34-35	126	10,328	58,260
Subsequent--	1940	[1] 91	848	2,502

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[1] 26 were new properties in 1940.

The number of properties with bushes, especially the new properties, seems large, unless one is familiar with the survey. Of the new properties found in the area covered, 3 were obviously missed on the initial survey. The bushes on the other 23 properties were bushes either too small to be found through the initial survey or which were not there at the time of the initial survey. It was noticeable that the new properties were practically all found within a short distance of old properties where bushes were previously destroyed. That the bushes were small is obvious from the fact that only an average of 27 pounds of salt was used on each property this year, as compared with 462 pounds per property on the initial survey.

Summary of 1940 work in the sugar pine region.--The Ribes-eradication program in the sugar pine region during 1940 was largely devoted to reeradication work on areas from which the initial Ribes removal had been done from 3 to 6 years before. Of 156,728 acres covered during 1940, the work on 106,232 acres was reeradication, and that on 50,496 acres was initial. Wild Ribes totaling 18,702,711 bushes were destroyed with the expenditure of 142,279 man-days of labor. On the basis of present acreage outlined for control treatment, complete control has now been established on approximately 18 percent of the control area in the region, and the job of initial eradication is 30 percent completed. During the season 40 camps were in operation, of which 16 were E. R. A., 16 C. C. C., 1 N. Y. A., and 7 Forest Service regular-fund camps. The distribution of personnel in these camps at the peak of the field season was as follows: E. R. A. 1,290 men, C. C. C. 1,320, N. Y. A. 10, and Forest Service regular camps 230. An interesting observation on the W. P. A. men employed is that of 1,711 men assigned to the project during the season, 857, or 50 percent, stayed less than 1 month. This rapid turnover in W. P. A. labor makes adequate supervision a real necessity to assure effective work. Although most of the work was done by standard hand-eradication practice, some problem areas were treated by special methods. Decapitation of Ribes and oil treatment of exposed crowns was used on 160 acres supporting rock-bound bushes in Lassen Volcanic National Park. In Yosemite National Park large Ribes nevadense bushes were destroyed by blasting with dynamite of 20-percent strength. Mechanical eradication was confined to the Sierra National Forest where a tractor, equipped with a bulldozer Ribes rake, was used to strip lanes through dense brush fields to facilitate the eradication of the Ribes by C. C. C. crews. Some especially heavy Ribes concentrations were eradicated by the use of a grapple plow powered from a drum winch on the tractor. In addition to eradication work, pine surveys were conducted on 100,258 acres of forest land to determine the sugar pine and Ribes populations in areas about which little information had hitherto been available. The acquisition of this information will enable control unit boundaries to be fixed more definitely.

Saratoga County, N. Y., aids blister rust control program.--Saratoga County, N. Y., which contains a large amount of white pine, has appropriated $5,000 for blister rust control work during 1941 and also provided District Leader Barber with excellent office space and a part-time clerk in the new County Building at Saratoga Springs. This county expended over $7,400 on control work in 1940.

Possibility of rust resistance in white pine to be studied.--Ray R. Hirt, of the State College of Forestry, Syracuse, N. Y., has begun a study of white pines to see if there are strains resistant to blister rust. He will test white pines propagated from cuttings taken from individual trees located in heavily diseased areas that show no visible evidence of blister rust infection. Cooperation has been sought from agencies concerned with propagation of white pines from cuttings and Professor Hirt is assured of numerous sources of possibly infected material in the Northeastern States.

COTTON INSECT INVESTIGATIONS

Micronized insecticides for cotton insects.--Experiments to determine the relation of particle size to toxicity of several insecticides were conducted last season. The materials were micronized or finely ground through the cooperation of the Micronizer Processing Company, Moorestown, N. J. The mean surface diameter of particles was measured with an air permeation apparatus by the Division of Insecticide Investigations.

The fine materials, such as calcium arsenate and barium fluosilicate, were but little affected by micronizing. The calcium arsenate averaged about 1.5 microns before and after micronizing and the barium fluosilicate was reduced from 3.0 to 1.5 microns surface mean diameter by the grinding. Paris green was reduced from 11.5 microns to 0.5 micron and derris was also much reduced. Micronized sulfur was a commercial product and not especially prepared for us. It had a surface mean diameter of particles of about 5 microns. Two percent of tri-calcium phosphate was added to the calcium arsenate as a conditioner and to prevent packing, and a small quantity of sand was used with the derris as an abrasive to assist in grinding. The original and micronized calcium arsenates containing low, intermediate, and high water-soluble arsenic by the Geneva method were used in cage tests at Tallulah against the boll weevil. The three original calcium arsenates (not micronized) seemed to have somewhat better dusting qualities and gave significantly higher weevil mortalities than the micronized materials. Also the calcium arsenates with the higher water-soluble arsenic caused higher weevil mortalities. In plot tests at Tallulah with a calcium arsenate intermediate in water-soluble arsenic, there were no significant differences in infestations and yields between the original and micronized samples. Mixtures of micronized calcium arsenate and regular derris, micronized calcium arsenate and micronized derris, and regular calcium arsenate and regular derris were tested for boll weevil and aphid control at State College, Miss., on 1/20-acre plots. There were no significant differences in boll weevil or aphid infestations between the treatments, but all the mixtures containing derris held the aphid infestation lower than in the checks and prevented the heavy build-up that occurred in the plots treated with calcium arsenate. However, in cage tests against the boll weevil at Tallulah the mixtures containing micronized materials did not give as high weevil mortalities as did the unmicronized mixture. In plot tests at Waco and Port Lavaca, Tex., a 1:2 mixture of calcium arsenate and micronized sulfur gave better flea hopper control than did a similar mixture of calcium arsenate and ground sulfur. Micronized sulfur used alone has given about as good flea hopper control as twice the poundage per acre of 325-mesh dusting sulfur, but it costs about twice as much as the regular ground dusting sulfur. It has the advantage of sticking to the plants better and can be dusted under more adverse conditions or used as a spray when the plants are dry and may have a place in flea hopper control. Micronized barium and sodium fluosilicates were much inferior to the original materials against the boll weevil in cage tests at Tallulah. Both of the micronized materials had very poor dusting qualities, which probably accounts for the reduced weevil mortalities. Micronized barium fluosilicate used as a dust and spray also gave less control of the bollworm than did the unmicronized dust in plot tests at Waco, Tex. However, in tests at Presidio, micronized cryolite caused greater reduction in the number of pink bollworm larvae per boll than did cryolites with regular and coarse particle sizes. A paris green with three sizes of particles was tested for control of the boll weevil and tarnished plant bug in cages at Tallulah. The particle sizes were (1) the original material (coarse), (2) ground in a hammer mill with a surface mean diameter of 11.5 microns, and (3) micronized with a surface mean diameter of 0.5 micron. Micronizing also apparently increased the water-soluble As_2O_5 from 0.8 percent in the sample ground in the hammer mill to 4.5 percent in the micronized sample. When mixed with lime and tested against the boll weevil none of the samples were very effective and there was little difference between them. When mixed with sulfur and tested against adults of the tarnished plant bug, the net mortalities averaged 64 percent for the regular particle sizes, 76 percent for the sample ground in a hammer mill, and 82 percent for the micronized sample. The net mortalities of the tarnished plant bug nymphs were 44, 51, and 50 percent, respectively. In plot tests at Mesa, Ariz., for control of *Lygus* spp., *Chlorochroa*, and other insects a 1:12 mixture of micronized paris green and clay gave an increase in cotton yield of 16 percent, as compared to an increase of 9 percent for a mixture of the regular paris green and clay. Thus the effectiveness of paris green and sulfur was considerably increased by micronizing, but there was little or no increase in the effectiveness of the other insecticides tested.

Survey of hemipterous insect damage to cotton in Arizona.--The annual survey was begun at the end of September and concluded in November by T. P. Cassidy and associates, Tucson, Ariz. A minimum of 500 bolls per field were examined for punctures from each of 97 representative fields selected from the main cotton areas of the State. Included in the examinations were 35,000 bolls from 70 fields of short-staple cotton and 27,000 bolls from 27 fields of long-staple cotton, or a total of 62,000 bolls for both types. The results in comparison with previous years are shown in the table.

County	Percentage of bolls punctured					
	Short-staple			Long-staple		
	1938	1939	1940	1938	1939	1940
Yuma----------	61.0	62.0	56.1	--	--	--
Maricopa-----	44.7	40.6	37.7	30.9	23.8	26.9
Graham--------	19.0	18.9	21.1	4.9	4.2	5.0
Pinal---------	17.8	18.8	20.3	5.6	5.1	18.1
Santa Cruz---	12.7	4.7	11.1	2.5	1.9	--
Pima----------	7.7	4.3	8.1	1.0	1.3	2.9
State average----	31.5	28.2	33.4	14.6	8.7	14.7

Surveys have been made during the last 7 years, and Yuma County has always shown the most extensive damage with the other counties consistently maintaining their relative positions in regard to hemipterous-insect damage. Long-staple cotton has also always been much less damaged than short-staple. The average damage for the State in both kinds of cotton was heavier in 1940 than in any other year since the surveys have been made. While making these examinations, records were also kept of the bolls damaged by bollworms. The average for the State was 0.73 percent of the short-staple bolls and 0.34 percent of the long-staple bolls damaged. These percentages do not include the total damage caused by hemipterous insects and bollworms, as many squares are also destroyed.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Planting of the 1941 cotton crop in the lower Rio Grande Valley.--While climatic conditions are such that cotton can be planted from late in January until late in spring, for the present season State regulations were promulgated establishing the planting period for the lower part of the Rio Grande Valley between February 1 and March 15, in an effort to retard spring fruiting. However, on account of hard rains throughout that entire region during the latter part of January, and general rains over the area during the greater part of February, only a comparatively small percentage of the cotton acreage had been planted at the end of February. With the excessive amount of moisture in the ground and the cool prevailing temperatures, it is believed that a considerable amount of the cottonseed planted will probably decay. The date for the beginning of cotton planting in the lower valley of Mexico was also fixed at February 1 by officials of the Mexican Department of Agriculture, and it was estimated at the close of the month that, despite very unfavorable conditions, approximately 50 percent of the crop had been planted. It is estimated that, because of the unusual amount of rainfall, there will be a considerable increase in the acreage planted to cotton in the Mexican areas adjacent to the lower Rio Grande Valley of Texas this season.

Destruction of sprout and volunteer cotton.--In the lower Rio Grande Valley cotton stalks are destroyed each season immediately after the harvesting of the crop, as a pink bollworm control measure. However, on account of the subtropical climate, sprout cotton continues to develop throughout the year from roots left in the ground after plowing, making it necessary to carry on an intensive campaign for the destruction of such plants during the off-cotton growing season in order to deprive the pink bollworm of propagating material. Owing to adverse cotton-growing conditions for the last 6 weeks or more, cotton sprouts made very little growth. During February inspectors continued to scout the areas where roads were passable to locate fields where grubbing would have to be done, as soon as the ground dries up sufficiently, to prevent the fruiting of volunteer cotton prior to the fruiting of the planted crop. Farming operations incident to the planting of the new crop will destroy most of the cotton stubble left in the fields.

Wild-cotton eradication.--In 1932 a program was begun to eradicate the pink bollworm from southern Florida through the destruction of the wild-cotton plant, which serves as a host to that dangerous cotton insect. For the present season wild-cotton eradication work is being carried on with approximately 200 C. C. C. enrollees and 102 W. P. A. workers, and a few laborers employed by the Bureau. The Bureau laborers have headquarters on houseboats, from which they work areas inaccessible by land. Conditions were not favorable in February, owing to rains, bad roads, and mosquitoes, but there was a slight improvement over the previous month, and good progress was made in all areas. In the Cape Sable area more acres were covered in February than in January. The first cleaning of the season was completed, with the exception of 2 small areas which could not be reached because of wet roads. A second cleaning of this area for the present season was begun about the middle of the month, and it was found that the area being worked for the second time could be covered rapidly, as fewer plants were encountered and work trails had been cleaned out during the first clean-up of the season. Good progress was made in the second recleaning over the entire Bradenton-Fort Myers subdistrict, which includes the counties of Pinellas, Hillsborough, Manatee, Sarasota, Charlotte, Lee, and Collier. In the Main Keys subdistrict, the Matecumbes and Long Key were completed, and second cleanings for the season were in progress in all other parts of that subdistrict. The number of seedlings found was considerably less than during the first cleaning, and few mature plants were encountered. This area was also covered rapidly, as work trails are excellent. In the Marathon-Key West section a second cleaning for the season was continued. The houseboat crew attached to the Cape Sable subdistrict scouted considerable area in the Whitewater Bay section and also in the Seven Palm Lake area. In addition, wild-cotton colonies on the islands in Florida Bay and on the Dade County mainland were cleaned. The houseboat crew attached to the Keys subdistrict spent the entire month scouting Biscayne Bay Keys. Several wild-cotton colonies, aggregating 7 acres, were found. During February a total of approximately 5,608 acres was covered, resulting in the finding of 6,316 plants with mature bolls, 89,812 seedling plants, and 195 sprout plants.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Rates of application of rotenone-bearing dusts against pea weevil.--During the summer of 1940, F. G. Hinman and W. E. Peay, of the Moscow, Idaho, laboratory, conducted toxicity tests on replicated small plots of peas in each of several fields to determine the effectiveness of several rotenone-bearing dusts when applied at several rates against Bruchus pisorum (L.). In 5 fields, embodying a total of 35 replicates for each insecticidal dust mixture, 1 dust containing 2 percent of rotenone applied at the rate of 11 pounds per acre resulted in 98.0-percent reduction in the numbers of living weevils in 24 hours, whereas a dust mixture containing 1 percent of rotenone resulted in 96.9 percent and 96.2 percent reduction for the same interval following application when applied at 20 and 10 pounds per acre, respectively. The first 2 of these treatments were also tested in 3 additional fields making a total of 8 fields altogether and comprising a total of 65 replicates for each treatment. An analysis of the data from the application of the 2 percent dust at 11 pounds per acre showed that this treatment resulted in an average of 97.1-percent reduction, as compared to an average of 96 percent for the 1-percent dust at the 20-pound rate. The latter percentages are significantly different. Should similar differences obtain another season, the growers may realize a considerable saving in treating their peas by reducing the rate of application and increasing the rotenone content of the dust mixture used. In 6 of the fields inferior results were obtained with a dust containing 0.5 percent rotenone and 1 percent of dinitro-o-cyclohexylphenol, which had given very promising results against this insect in small-scale tests conducted in the laboratory. The plots of peas used in these tests were located on the borders of peafields and had been planted earlier than the remainder of the fields, in order to trap the weevils as they emerged from hibernation and moved into the fields. Each plot was 20 feet wide and about 218 feet long, comprising approximately 1/10 acre. All applications were made with a power duster mounted on a

2-wheeled trailer pulled through the plots by a truck and equipped with a trailing apron. The weevil population was determined before application and at 24 hours after, by counting the number of adult weevils collected in 50 sweeps of a standard insect net in each plot, 25 sweeps being made at random in 2 parts of each plot. The diluent used in all dust mixtures was diatomaceous earth. The source of the rotenone for the mixtures used in some fields was derris root powder, in others it was cube root powder.

Arsenical residues on cauliflower.--Field studies by C. E. Smith and P. K. Harrison, of the Baton Rouge, La., laboratory, indicate that arsenicals should not be applied to cauliflower after leaves have developed that will be present on the marketed product. None of the leaves that had been dusted was present on the marketed portion of plants to which the last application of arsenical had been made 29 days prior to harvest, on November 12. The number of such leaves and the residue analyses of cauliflower treated at different times with a dust mixture of calcium arsenate and paris green (10 pounds to 1 pound) were as follows:

Number of applications	Days between last dust application and harvest	Rainfall during this interval	As_2O_3 per pound of cauliflower at harvest	Average dust leaves appearing on marketed product
	Number	Inches	Grains	Number
9-----------	8	5.89	0.1335	25
8-----------	19	7.12	.0536	18
7-----------	29	7.12	.0037	0
None--------	--	--	.0009	--

Single plots of cauliflower 105 feet long and 5 rows wide were employed in this study. The applications of insecticide were made with rotary hand-operated dusters, beginning on August 12 at 5 pounds per acre and repeated at intervals of approximately 10 days. Most of the applications were made at the rate of about 10 pounds per acre, but the final application on 2 of the plots was at 30 pounds and 20 pounds per acre, respectively. Harvest extended over the period November 12 to December 11, but the above analyses were based on 10 plants taken from each plot at the beginning of harvest on November 12. W. P. Denson, of the Louisiana Agricultural Experiment Station, made all of the analyses, using the opposite quarters of each sample plant as prepared for market, including both curd and leaves. The number of dusted leaves was determined by counting those present after the plant had been prepared for market. This count was made possible by notching the smallest leaf present on each plant at the final application.

Diluents for natural cryolite in controlling tomato fruitworm.--J. Wilcox and R. E. Campbell, of the Alhambra, Calif., laboratory, report that a smaller percentage of tomato fruits were damaged by Heliothis armigera (Hbn.) on plants treated with a dust mixture of natural cryolite containing 70 percent Na_3AlF_6 diluted with talc and with soapstone than on plants treated with natural cryolite of the same strength diluted with sterilized tobacco dust or with walnut-shell flour. Following are the results obtained from using various diluents in one series of experiments:

Diluent used	Average percentage of fruits damaged
Soapstone	1.6
Talc and mineral oil (19-1)	1.8
Talc	2.2
Talc and soybean flour (9-1)	2.2
Talc and basic copper ammonium silicate (4-1)	2.4
Diatomaceous earth	3.0
Corn flour	3.4
Talc and basic copper chloride (6-1)	3.5
Walnut-shell flour	4.5
Sterilized tobacco dust	5.4

In replicated undusted plots in another experiment in the same field 17.5 percent of the fruits were damaged. An analysis of these data showed that the differences between the averages for the first four treatments and those for the last three were significant. The treatments were replicated in three randomized blocks, each plot being 30 by 60 feet. Three applications of the dust mixture were made at intervals of 2 weeks, using rotary hand-operated dusters, beginning when the first fruits set. The rate of application was 20, 30, and 40 pounds per acre for the three applications, respectively. The percentage of injured fruits was determined at picking by examining all of the tomatoes on five plants taken at random in each plot.

Tobacco field as breeding ground of tobacco flea beetle.--Clemence Levin and associates, of the Oxford, N. C., laboratory, determined the seasonal emergence of adults of *Epitrix parvula* (F.) from larvae developing in the soil around tobacco plants in a field of tobacco grown for flue-curing during the summer of 1940. The results of the study showed the importance of the tobacco field as a breeding ground of the beetle and indicated the possible value of cultural measures for the control of this pest. Tobacco transplanted to the field on May 17 soon became infested with overwintering beetles, there being from 2 to 4 per plant during the period May 22 to June 18. On June 11, before appreciable numbers of beetles of the newly emerged generation could have reached the field from the tobacco-plant beds, a series of field plants which had been infested by overwintering beetles was caged and treated with an insecticide. Beetles began to emerge from the soil in these cages on June 19 and by July 1 an average of 10 per cage had been removed. By July 22 an average of 21 per plant had emerged. Another series of plants protected from beetles prior to the time that newly emerging beetles reached the field from plant beds were exposed to infestation during the period June 11 to 27 to obtain an indication of the importance of oviposition by the new-generation beetles coming from the plant beds. On the latter date the plants were caged again and all infesting beetles killed. Beetles began to emerge from these cages on July 10 and by July 23 an average of 23 beetles per plant had emerged. A large proportion of these are thought to have developed from eggs laid by the new-generation beetles that emerged in tobacco-plant beds and moved to the field. The beetle emergence from field plants caged at intervals throughout the growing season was also determined. These studies showed that the peak of beetle emergence occurred during July and August. It was also found that large numbers of beetles emerged continuously for several weeks after the last leaves of tobacco had been harvested, indicating the possible value of cultural operations immediately following harvest to prevent further emergence of beetles in the field. For these studies 10 cages were used in each series and each cage covered an area of 1 square foot, being centered over and enclosing a tobacco plant trimmed so as to occupy the available space.

Wireworm infestation first year following alfalfa.--Field studies conducted by F. H. Shirck, of the Parma, Idaho, laboratory, showed that the infestation of wireworms, principally *Limonius californicus* Mann., may not increase during the first year on land returned to other crops following the growth of alfalfa for several years for reducing the infestation of wireworms. In some fields the numbers remained fairly stationary, whereas in others a further decrease in population was observed. The data obtained from 26 old fields of alfalfa showed an average population of 1.6 wireworms per square foot of soil surface when the fields were plowed up and only 1.9 wireworms per square foot following the first crop. The first-year crops following the plowing under of the old alfalfa included in this study comprised sugar beets, potatoes, wheat, oats, and corn. Similar counts made in 37 other old alfalfa fields showed an average infestation of 1.6 wireworms per square foot when the fields were plowed up.

Host preference of sweetpotato weevil.--K. L. Cockerham and O. T. Deen, of the Sunset, La., laboratory, report that in field-plot tests greater numbers of *Cylas formicarius* (L.) developed in the vines and crowns of sweetpotato plants (*Ipomoea batatas*) than in those of five wild-host species of the genus *Ipomoea*. The following tabulation shows the numbers of sweetpotato weevils found at the close of the season in the vines and crowns of each of the six species of plants included in this test.

Host plant	Average number of C. formicarius per plant
Sweetpotato	[1/] 35
I. quamoclit	8
I. trichocarpa	6
I. hederacea	9
I. pandurata	2
I. barbigera	12

[1/] An average of 57 additional specimens of the weevil per plant were taken from the roots of these sweetpotatoes.

The experimental plants were grown in plots containing four plants each, there being six plots of each host arranged in a Latin square. The plants were transplanted to the plots in June and the plots were located in an area heavily infested with weevils. Examination of all plants to determine infestation by the sweetpotato weevil was made in October.

INSECTS AFFECTING MAN AND ANIMALS

Necessity of a low oxygen concentration for hatching of Aedes mosquito eggs.--E. F. Knipling and C. M. Gjullin, of the Portland, Oreg., laboratory, report that additional information has been obtained which indicates that, although other stimuli may exist which may influence the hatching of Aedes eggs, the reduction of dissolved oxygen is of itself capable of causing as rapid and as high a percentage of hatch as may be obtained by the best methods now known.

Beet molasses as a dispersing agent for phenothiazine.--Mr. Knipling also reports that beet molasses may be useful as a wetting agent for dispersing phenothiazine in water. When used in the same manner as is Turkey Red oil or other wetting agents, at the rate of 5 parts molasses to 1 part phenothiazine, a fair suspension of the phenothiazine was obtained.

Winter emergence of stable flies.--W. E. Dove and S. W. Simmons, of the Panama City, Fla., laboratory, report that recovery cages placed over infested peanut litter on December 14, have shown a continuous emergence of "dog flies," especially on warmer days. At the present time (March 7) some of these cages contain numbers of larvae that have not yet pupated.

Screwworm control program.--A press release on the general status of the screwworm for the United States was prepared by D. C. Parman, W. L. Barrett, Jr., H. M. Brundrett, and E. C. Cushing, of the Uvalde and Menard, Tex., laboratories. On the basis of data supplied to the Texas Extension Service, that organization made a radio broadcast on February 18 from College Station giving information to Texas ranchmen on the present status of screwworms in the State and advised procedures to avoid outbreaks of the fly during the coming season. The Ranch Management Screwworm Prevention Program of the Bureau was presented to entomologists by E. C. Cushing at a joint meeting of the Texas Entomological Society and the Cotton States Branch at Waco, Tex., on February 8.

FOREIGN PLANT QUARANTINES

"Gladiolus smut" not a smut.--Considerable numbers of gladiolus corms in large shipments from Netherlands inspected in March 1940 were found to be infected with a fungus similar to one found in a shipment in 1939 and determined then by J. A. Stevenson, mycologist of the Bureau of Plant Industry , and D. P. Limber as Papulospora sp. When the large volume of material arrived in 1940 Mr. Limber took some of it to Mr. Stevenson and called attention to the similarity of the fungus with one found on gladiolus corms in Pennsylvania, as pictured in Phytopathology (28:599, August 1938) and tentatively determined as Urocystis gladioli (Requien) Smith. They agreed that the fungus on imported corms was probably the same as the one in Pennsylvania and known as Urocystis gladioli. Upon learning that U. gladioli had been found on these corms

N. Rex Hunt requested specimens for use in obtaining illustrations to accompany a short write-up of the gladiolus smut ready for reproduction as one of a series of plant-disease papers being prepared for the information of inspectors. Microscopic examination confirmed Mr. Hunt's immediate impression that a species of Papulospora was present. No Urocystis was found. The importance of the problem from the quarantine and treatment points of view was such that it was believed desirable to have the whole matter taken up with specialists. After some discussion between H. S. Dean and W. A. McCubbin, as well as Stevenson and Limber, Mr. Hunt put the case into Mr. Stevenson's hands. The latter sent material and cultures to George L. Zundel, specialist in smuts, at Pennsylvania State College and to J. W. Hotson, specialist in bulbil-producing fungi, at the University of Washington. Dr. Zundel in turn had cultures of the fungus found in Pennsylvania sent to Dr. Hotson by the pathologist who had studied it. A letter from Dr. Zundel to Mr. Stevenson dated March 20, 1940, indicated that the fungus sent him from the imported gladiolus corms was not a Urocystis. A letter dated May 17, 1940, from Dr. Hotson to Mr. Stevenson stated that the fungus found on imported gladiolus corms at the Inspection House was Papulospora coprophila (Zukal) Hotson, but that the fungus found on gladiolus corms in Pennsylvania, also a Papulospora, was a different species which he might describe as new. We had not expected to issue this information in the News Letter until the results of more complete studies were published by Dr. Hotson and by the Pennsylvania pathologists. However, a note in Science (93:111, January 31, 1941) calls attention to the fact that the Pennsylvania fungus seems to be a Papulospora. It therefore seems desirable to note the findings incidental to the work of this Division without further delay. The specialists seem to doubt that a true smut has been involved at any time in the studies and reports of Urocystis gladioli in this country.

Entomological interceptions of interest.--Two living larvae of the trypetid Anastrepha serpentina (Wied.) were taken at El Paso, Tex., on February 13 in sapote in baggage from Mexico. Twenty living larvae of the trypetid Anastrepha mombinpraeoptans Sein were intercepted at New York on January 30 in Spondias dulcis in baggage from Puerto Rico. Larva of the pink bollworm (Pectinophora gossypiella (Saund.)) was taken at Miami, Fla., on January 1, in cottonseed in express on an airplane from Brazil. The coccid Ceroplastes rubens Mask. was found at Seattle, Wash., on January 17 on the stem of a camellia in cargo from Japan. A living adult of the pentatomid Mecistorhinus melanoleucus (Westw.) was taken at Mobile, Ala., on February 13 on banana in cargo from British Honduras. A pupa of the Mediterranean fruitfly (Ceratitis capitata Wied.) was intercepted at New York on February 13 on a tangerine in baggage from Portugal. Living specimens of the aleyrodid Pealius hibisci (Kot.) were intercepted at San Francisco, Calif., on February 8 on Hibiscus sp. in baggage from Hawaii. Three specimens of the bruchid Bruchidius lividimanus (Gyll.) were found at the Inspection House, Washington, D. C., on February 11 in the seed of Genista sp. (?) in mail from Portugal. One living adult of the chrysomelid Chelymorpha comata Boh. was intercepted at New York on February 10 on mustard greens in cargo from Cuba. Living adults of the curculionid Dynatopechus aureopilosus (Fairm.) were found in parcel-post inspection at Honolulu, Hawaii, on January 10, in the seed of Mucuna gigantea. A living specimen of the mirid Fulvius quadristillatus (Stal) was found at San Francisco, Calif., on January 8 on an orchid in cargo from Brazil. Two living adults of the lygaeid Scolopostethus decoratus (Hahn) were intercepted at Hoboken, N. J., on February 14 in moss used as packing for miscellaneous shrubs in cargo from England. Three living adults of the bruchid Bruchidius versicolor (Boh.) were taken in mail at San Francisco, Calif., on February 11 in seeds of Podalyria argentea from the Union of South Africa. A living adult of the lygaeid Orthaea scutellatus (Dall.) was intercepted at New York on February 3 on white greens in cargo from Cuba. Specimens of the citrus blackfly (Aleurocanthus woglumi Ashby) were found at Baltimore, Md., on February 4 on an orange leaf in cargo from the Bahamas. One living specimen of the pentatomid Schaefferella incisa H. S., was found at San Francisco, Calif., on January 8 on an orchid in cargo from Brazil.

Pathological interceptions of interest.--A Mexican tomato intercepted at Brownsville on February 12 and sent in for determination of the fungus found on a spot on the fruit was found to be infested with nematodes, apparently Aphelenchoides parietinus (Bastian) Steiner, and the fungus no longer prominent on the spot. Asterina delitescens Ell. & Mart. was intercepted at El Paso on February 17 on Persea borbonia leaves from Mexico. Bacterium citri (Hasse) Doidge was intercepted on February 5 at Seattle on Chinese oranges in baggage. Bacterium punctilans Bryan is being found more often on Mexican tomatoes this year, Nogales alone reporting 59 interceptions in February following 99 such interceptions in January. Ceratostomella ulmi (Schwarz) Buisman was found at the Bloomfield laboratory in elm wood taken at New York on January 17 from crates from England. Cerebella andropogonis Ces. and Fusarium heterosporum Nels. were intercepted on January 31 at New York on paspalum seed from Australia. Phyllosticta erythroxyli Graz. was intercepted on January 29 at New York on Erythroxylon coca leaves from Peru. At the same port radishes from Portugal were found to be infested with Pratylenchus sp. (near P. pratensis (de Man) Filipjev) and Tylenchus sp. (near T. filiformis Butschli), on February 8. Puccinia polygoni-amphibii persicariae (Str.) Arth. was found on Polygonum sp. used as part of the packing in a mail parcel from Canada intercepted on February 4 at Buffalo. A Rhabdospora found infecting Ephedra vulgaris in a shipment from China, inspected at New York on May 10, 1940, has just been determined as R. kirghisorum (Thum.) Sacc. A peculiar form of citrus scab found at New York on February 26 on a lemon from Australia has been determined by Anna E. Jenkins as probably Sphaceloma fawcettii var. scabiosa (McAlp. & Tryon) Jenkins.

DOMESTIC PLANT QUARANTINES

Citrus canker found at Corpus Christi and Navasota, Tex.--Citrus canker was discovered at Corpus Christi about January 31 by a Texas State inspector in the regular course of nursery inspection. On being notified of this discovery, Federal and State inspectors immediately investigated the case and learned that the 43 infected Citrus trifoliata trees had been transported last fall from Navasota, in Grimes County, Tex., by a nursery-stock peddler, and further that he had brought in a second lot of such trees from the same source and planted them in a hedge on another property in Corpus Christi. Citrus canker was found on these trees also and the entire hedge was then destroyed, along with all the citrus trees on the

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first-named property. An increased force of inspectors then inspected every nursery, heel yard, and flower establishment in Corpus Christi and is now conducting a property-by-property inspection of the entire city. To date no other cases of canker have been found in Corpus Christi. In the town of Navasota, intensive inspection was begun at once and citrus canker was found not only on the property from which the infected trees at Corpus Christi originated but also on 5 other properties, principally on hedges of Citrus trifoliata. It appears that trees of this species have been used in Navasota as hedges for fencing or for ornamental purposes for the last 25 or 30 years, and there are approximately 75 such hedges in the town. There are few other citrus trees, however, and the owners are giving splendid cooperation in permitting the destruction of these hedges, and crews of W. P. A. laborers are at work taking them out. County agents, both colored and white, are assisting in obtaining the consent of owners to the removal of these trees, and county and city officials are also cooperating. Every precaution is being taken to prevent the development of any seedlings or of recurring infections of canker. Before any laborers were allowed on the infected properties, the trees and surrounding soil were disinfected and gone over with a flame-thrower, and the soil to a depth of 1 inch was removed around the trees and buried in pits 8 feet deep, together with all fruit and seed that could be found. All seedlings were dug and burned and the large trees were pulled with a truck, and the areas where they stood were plowed under. After these operations were completed the ground was again sprayed with disinfectant. Corpus Christi is the southernmost point at which canker has been found since the work was placed on an intensive and expanded basis in 1935. At no time in these inspection and eradication activities of the last 7 years has citrus canker been found in either of these 2 counties, Nueces in the south or Grimes in the north.

Clean-up of citrus trees at Alta Loma, Tex.--Following the finding on December 4, of a tree infected with citrus canker, a program of clean-up and inspection of the town of Alta Loma, Tex., was conducted, because of the large growth of underbrush which could easily conceal wild-citrus growth. Nearly 200 dooryard or escaped citrus trees scattered over vacant lots were destroyed. On the property where the recent infection occurred, an intensified search resulted in finding 17 additional very small citrus trees, including 1 orange seedling growing under the residence. Citrus canker at Alta Loma has not been found, in current activities, to extend beyond the single tree found infected in December.

First highway post office in United States established.--As part of the Railway Mail Service, a highway post office, the first in this country, was established on February 6, operating between Washington, D. C., and Harrisonburg, Va. This highway post office, serving 23 post offices on the route and handling all classes of mail, including parcel post, constitutes another outlet for the interstate transportation of articles, restricted under the Japanese beetle and other quarantines, from a regulated area to points outside.

Inspector believes soil in cars picked up by electro-magnet loader.--From the transit inspector at Birmingham, comes the following interesting comment: "Carlot shipments of scrap metal from the white-fringed beetle area continue to be a source of apparent violations. Although most of the cars carrying scrap metal do not have soil in the bottom, some do. The presence of soil in the cars may be due, in part, to the fact that much of the scrap metal is loaded by means of electro-magnets. During loading operations quantities of soil may be attracted to the electro-magnets, owing to the large amount of iron rust present in the top soil. At a local junk yard, in 1 year's time so much iron rust accumulated in the soil under a pile of scrap that after the scrap was removed the top soil was loaded into railroad cars by means of an electro-magnet and sold to local steel companies."

More shipping by air express.--From the Boston transit inspector comes the report of an increase in February of 200 percent in plant shipping by air express, as compared with February of last year. Cut flowers, miniature potted plants, and pussy willow cuttings were so shipped throughout the month, particularly at the valentine season.

Larvae of Laspeyresia species intercepted at Springfield, Mass.--Larvae from spruce cones taken from a shipment intercepted at Springfield, Mass., on December 6, as a violation of the gypsy moth quarantine, were recently identified as Laspeyresia youngana, and also the pine-shoot moth and the codling moth.

Peach mosaic conference at Denver.--On February 10, 11, and 12, a conference of Federal and State workers on peach mosaic disease was held at Denver to discuss the various phases of the control and research activities, particularly as they relate to conditions in Colorado. Representatives of the Bureau of Entomology and Plant Quarantine, the Bureau of Plant Industry, the Colorado and Utah State Departments of Agriculture, and the Colorado State College were present. The discussion revolved around a review of control and research accomplishments, with a view to determining future procedure in both these activities. It was pointed out that a phenomenon not yet known to be peach mosaic occurs in Colorado, and the consensus of opinion at the meeting favored marking such trees for future observation, with a provision that such marked trees would be removed by the cooperating peach mosaic control agencies only at the request of the grower, but that all definitely mosaic infected trees would be removed when discovered. The group recommended that research activities continue along the presently organized outlines, with minor suggestions for additional work with regard to symptomology, methods of transmission, methods of diagnosis, and possible methods of treatment.

Inspector's identification of peach mosaic upheld.--Infection found on a peach nursery tree in Bryan County, Okla., last fall, was identified by the inspector as peach mosaic. Some question as to the determination of the disease arose and the tree was later transferred to the laboratory of the Bureau of Plant Industry at Brownwood, Tex., and representatives of that Bureau now confirm the diagnosis as positive peach mosaic infection.

Mormon crickets hatch in February.--Mormon crickets were reported hatching early in February on the Warm Springs Indian Reservation in Oregon.

Later reports indicated some hatching in Baker County, Oreg. Arrangements have been made with the cooperating State agencies to make careful continued observations throughout areas of early hatch to determine the need and appropriate time for the initiation of control activities. Equipment, materials, and personnel are in readiness for any eventuality that may arise from the early hatch.

Legume weevil survey planned.--On January 13 the Secretary approved an allocation of funds for further work on the legume weevil Hypera brunneipennis Boh. and plans have been made for the reexamination of part of the areas surveyed last year in order to determine the present status of the infestations and to cooperate with the State of Arizona in an effort to eradicate the weevils in the vicinity of Tempe. The infestation at Tempe is light and isolated, but it is located in an important legume-growing region.

Parlatoria scale survey completed.--The survey, which was begun early in December, in cooperation with the Missouri State Department of Agriculture, to determine the area infested with Parlatoria chinensis Marl. in St. Louis and vicinity, was terminated at the close of January. Infestations were found on 850 properties in approximately 109 city blocks within the immediate vicinity of the Missouri Botanical Garden, and Tower Grove and Forest Parks. Heaviest infestations were found within, and immediately adjacent to, the Missouri Botanical Garden, decreasing in intensity to little or no infestation within a distance of several blocks to less than a mile in all directions. A number of inspections were also made in scattered areas throughout the city. Only one small infestation was found outside the above-mentioned localities. A survey of East St. Louis was also made, in cooperation with inspectors of the Illinois State Department of Agriculture, but no infestations of the scale were found.

Treatment method for white-fringed beetle larvae modified.--The method of treatment of balled nursery stock by methyl bromide solution for white-fringed beetle larvae was modified by a revision of circular B. E. P. Q. 503 dated February 28. As a result of further experiments by the Division of Control Investigations, it has been found that the prescribed treatment is effective on soil balls up to 8 inches in diameter in areas other than in New Orleans and vicinity. In these areas the consistency of the soil is such that the treatment can be used effectively only on soil balls having a diameter of not more than 7 inches.

CONTROL INVESTIGATIONS

Action of o-dichlorobenzene and naphthalene mixture as applied by new method.--W. N. Sullivan and E. R. McGovran, of this Division, and L. D. Goodhue, of the Division of Insecticide Investigations, have collaborated in this study and published their results in the February 1941 issue of the Journal of Economic Entomology. A new method was described for applying a mixture of naphthalene and orthodichlorobenzene, which consisted in rapidly volatilizing a solution of naphthalene in orthodichlorobenzene by spraying it on a surface heated to 375° C. An effective dosage was obtained in about 8 minutes and very little crystallization of the naphthalene followed. Eighty cubic centimeters of this solution was used in a 216-cubic foot chamber in which flies and cockroaches were exposed for 24 hours. The mortality of the flies was 100 percent after 1 day, but more time was required to kill the cockroaches, the nymphs being more resistant than the adults. Over 95 percent were dead after 3 days and over 99 percent after 10 days. The use of these materials applied by this method offers promise for the control of household insects. Since this paper was submitted for publication further work on this subject has shown how to greatly increase the effectiveness of aerosols applied in this manner. These results will be published soon.

INSECTICIDE INVESTIGATIONS

Removal of lead and arsenic spray residues on apples.--At the meeting of the Western Cooperative Spray Project in Seattle, Wash., on February 13 and 14, C. C. Cassil, of this Division, and Edwin Smith and A. L. Ryall, of the Bureau of Plant Industry, presented the results of cooperative experiments on the removal of lead and arsenic spray residues from apples. The data presented in this report indicate that only fruit sprayed with relatively light spray schedules can be cleaned by washing once in cold acid. The use of somewhat heavier spray schedules requires the application of some heat in single or dual washes for satisfactory cleaning. Fruit with heavy spray schedules can be cleaned to meet the new tolerances only by the application of relatively severe dual-process washes at temperatures which approach or are beyond the danger point of fruit injury.

Improved method for determining arsenic.--C. C. Cassil, in the February 1941 issue of the Journal of the Association of Official Agricultural Chemists (v. 24, No. 1: 196-202), described a procedure for the rapid determination of arsenic. This method is an extension of the micro method described by Cassil and Wichmann in May 1939 (ibid., v. 22, No. 2: 436-445). The range of the rapid volumetric method for determining arsenic, previously considered as 5-500 micrograms, has been extended to 10 milligrams of As_2O_3. It is possible to complete a determination in less than 10 minutes after the necessary sample preparation. This method involves an arsine evolution, absorption in mercuric chloride-gum arabic solution, and an iodine titration. Results presented show that the accuracy of the method is 99.26 percent, with a standard deviation of 1.14 percent.

BEE CULTURE

Nosema disease an important cause of winter loss.--C. L. Farrar, Madison, Wis., reports the presence of *Nosema apis* in 16.5 percent of 97 colonies examined and adds: "Diagnosis was made by examining the ventriculi of 6 to 12 bees from the top of the cluster and it is probable that other colonies contained a lighter degree of infection. Colonies showing infection of 50 to 100 percent of the bees in the sample were weak and showed strong evidence of dysentery. There was no relationship between *Nosema* infection and distention of the hind gut. Twenty-seven and 36 percent, respectively, of bees picked up from snow in the 2 yards were found infected. Caged samples of 800 to 1,000 bees inoculated with 5 ventriculi from diseased bees added to sugar sirup showed 100-percent infection within 5 days (based on small samples) and practically all the bees died within 2 weeks. Uninoculated duplicates showed a very light infection and these approached complete infection 2 weeks after the inoculated cages. The peak in the mortality curves occurred approximately 2 weeks later in the check cages. Thirty colonies used in the greenhouse for experimental feeding of pollen and pollen supplements all showed Nosema. The experimental colonies were started with 4 pounds of bees (approximately 14,000) and they reared up to 9,300 bees under the most favorable food conditions. They probably had not more than 3,000 to 6,000 bees at the close of the tests. Brood-rearing decreased rapidly as the infection built up and practically ceased after 6 to 8 weeks. The queens all continued laying throughout the 90-day test period. Nosema is apparently more serious under the close confinement of colonies in the greenhouse than in normal colonies wintered out of doors. Diagnosis of bees heavily infected with Nosema spores can be made by noting the color of the ventriculus, but a microscopic examination of a smear is necessary for light infections. A heavily infested ventriculus shows a milky-white color which becomes more evident in a water smear."

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Injury to buildings by certain cossonine weevils.--Weevil specimens received from J. S. Houser, of the Ohio Agricultural Experiment Station, with the statement that they were reared from a door in a basement at Sterling, Ohio, have been determined as Stenoscelis brevis (Boh.), a common species of the Cossoninae which, however, is almost always taken out of doors. Its occurrence indoors is, therefore, of some interest, particularly as the weevil appears to have done considerable damage to this dwelling. The cossonine which is most often implicated in injury to timbers in buildings is Hexarthrum ulkei Horn, though Tomolips quercicola (Boh.) has been collected under conditions indicating that it also may occasionally damage woodwork or timbers indoors. The introduced cossonine, Pselactus spadix (Hbst.), has been reported at least once from damp wood in a basement at Brewster, Mass., and this species has been found also in pilings of wharves at Charlestown and East Boston, Mass.

Distribution note on the weevil Ceutorhynchus sericans Lec.--Among a small collection of weevils from White Heath, Ill., sent for determination by J. C. Dirks, was a single female of Ceutorhynchus sericans Lec. This little-known species was described in 1876 from Calaveras, Calif. It is represented in the National Museum collection by a single specimen from California, a few others from Idaho, Montana, Colorado, New Mexico, and Arizona, and a single male from Marietta, Ohio. Both the Ohio and Illinois specimens are larger and perhaps a trifle stouter than any of those from farther west (this reversing the condition observed in certain other species of weevils, in which the western form is larger), but so far as found they do not differ appreciably in other respects, and there seems no doubt as to the specific identity of all of them.

High parasitization of a leafhopper by a pipunculid.--Samples of Alconeura macra Griffith (Cicadellidae), submitted for identification in connection with investigations of the phony peach disease in Tennessee, were found to show an unusually high percentage of parasitization by an undetermined species of Pipunculidae (Diptera). Of the 97 specimens, representing 10 samples submitted for identification, 23 specimens, or approximately 24 percent of the total, either contained parasites or showed unmistakable evidence of having been parasitized.

Observation on hibernation of northern house mosquito.--A sample consisting of a large number of mosquitoes, determined by Alan Stone as *Culex pipiens* L., was recently received from J. S. Houser, of the Ohio Agricultural Experiment Station. Dr. Houser explained that the specimens had been taken in the basement of an unoccupied farm dwelling in February. The walls of the basement were of stone and the floor was of earth. Ice had formed in depressions in the floor and frost crystals occurred in abundance on the overhead joists. The hibernating mosquitoes were found in enormous numbers resting on these joists.

Unusual parasitic Hymenoptera in a collection from Virginia.--Ichneumonidae and Braconidae taken at Mountain Lake, Va. (elevation 4,000 ft.), and referred for identification by L. J. Milne, of Randolph-Macon Woman's College, contained numerous forms which are of interest because they have been seldom collected. Included were 2 rare species of the braconid genus *Meteorus*, a long series of an undescribed leafhopper parasite belonging to *Chelogynus* (family Dryinidae), several uncommon species of the ichneumonid genus *Parabates*, and about 100 specimens of *Hybophanes nasutus* (Cress.) (family Ichneumonidae) and 22 of a species of the related genus *Neliopiathus*, both of which are rare in collections.

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